

ENVIRONMENTAL ASSESSMENT
2003
GYPSY MOTH SUPPRESSION PROJECT

AT

Patuxent Research Refuge
Beltsville Agricultural Research Center
James J. Rowley Training Center
National Plant Materials Center
National Plant Germplasm and Biotechnology Laboratory
Goddard Space Flight Center

April 11, 2003

TABLE OF CONTENTS
GYPSY MOTH SUPPRESSION PROJECT EA

1.0 PURPOSE AND NEED FOR ACTION

1.1 Proposed Action.....	1
1.2 Need for Action.....	1
1.3 Objective of Proposed Action	4
1.4 Relationship to Other Decisions	4
1.4.1 Final Environmental Impact Statement.....	4

1.5 Decisions to be Made	5
1.6 Public Involvement and Issues	5

1.6.1 Summary of Public Involvement and Notification Process	6
1.6.2 Issues Considered in Detail.....	6

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION..... 7

2.1 Alternatives Not Considered in Detail.	7
2.2 Alternatives Considered in Detail	7

2.2.1 Alternative 1 – No Action	7
2.2.2 Alternative 2 – One Aerial Application of <i>Bacillus thuringiensis</i> (<i>Btk</i>)	7
2.2.3 Alternative 3 – Two Aerial Applications of <i>Btk</i>	8
2.2.4 Alternative 4 – Two Aerial Applications of Gypchek®.....	8
2.2.5 Alternative 5 – One Aerial Application of Gypchek® - (Proposed Action)	8
2.2.6 Standard Application Precautions Pertaining to Human Health, Security, and Safety Issues.....	8

3.0 AFFECTED ENVIRONMENT..... 11

3.1 Host Vegetation.....	11
3.2 Geography.....	11
3.3 Land Use	11
3.4 Human Population Density	13
3.5 Non-Target Organisms within Proposed Treatment Areas.....	14
3.6 Threatened and Endangered Species.....	14
3.7 National Historic Places	15
3.8 Wetlands and Floodplains	15

4.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES..... 15

4.1 Alternative 1 – No Action.....	15
4.2 Alternative 2 – One Aerial Application of <i>Btk</i>	17
4.3 Alternative 3 – Two Aerial Applications of <i>Btk</i>	19
4.4 Alternative 4 – Two Aerial Applications of Gypchek®	19
4.5 Alternative 5 – One Aerial Application of Gypchek® - (Proposed Action).....	20
4.6 Comparative Summary of Each Alternative and the Consequences	22
4.7 Irreversible and Irretrievable Commitment of Resources.....	23

5.0 LIST OF PREPARERS 23

6.0 LIST OF AGENCIES AND PERSONS CONSULTED 23

7.0 LITERATURE CITED24

APPENDIX A: Maps of the 2003 Proposed Gypsy Moth Treatment Areas25

APPENDIX B: Letters from USDI Fish and Wildlife Service and Maryland
Department of Natural Resources, Wildlife and Heritage Service.....34

1.0 PURPOSE OF AND NEED FOR ACTION

1.1 Proposed Action

Six Federal sites propose the suppression of gypsy moth (*Lymantria dispar*) populations on Federal lands in Maryland. Suppression activities would occur in 2003 on approximately 4,034 acres located in portions of Prince Georges and Anne Arundel Counties (Appendix A).

The Federal sites involved in the proposed project include: the U.S. Department of Interior, Fish and Wildlife Service, Patuxent Research Refuge (PRR), the U.S. Department of Agriculture, Agricultural Research Service, Beltsville Agricultural Research Center (BARC), the U. S. Department of Treasury, U.S. Secret Service, James J. Rowley Training Center (JJRTC), the U.S. Department of Agriculture, Natural Resources Conservation Service, National Plant Materials Center (NPMC), the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, National Plant Germplasm and Biotechnology Laboratory (NPGBL), and the National Aeronautics and Space Administration, Goddard Space Flight Center (GSFC).

Maps of the proposed treatment areas are contained in Appendix A.

Individual site acreages are:	PRR.....	2,782 acres
	BARC.....	986 acres
	JJRTC.....	92 acres
	NPMC.....	72 acres
	NPGBL.....	60 acres
	GSFC.....	42 acres

The proposed treatment would consist of a single application of the gypsy moth nucleopolyhedrosis virus product, Gypchek®, at 4×10^{11} occlusion bodies (OB's) /acre at an application rate of 1 gallon per acre.

The purpose for the proposed action is to prevent gypsy moth defoliation in order to reduce the negative aesthetic, economic, and environmental impacts which conflict with site management objectives, while minimizing any adverse impacts of the treatments on the environment. The USDA Forest Service would coordinate the effort. The proposed treatment would take place in mid-April to mid-May. Personnel from the USDA Forest Service would select a treatment time to coincide with the most susceptible caterpillar stages of the gypsy moth. An aerial contractor under the supervision of USDA Forest Service personnel would apply the insecticide.

1.2 Need For Action

The gypsy moth, a native of Europe, was accidentally introduced into North America in the late 1860's in eastern Massachusetts. Since that time the moth has become established throughout the Northeastern United States, into Michigan, Wisconsin, Illinois, Indiana, Ohio, West Virginia, and Virginia, and continues to spread further south and west into uninfested areas.

The expected impacts of gypsy moth defoliation include tree mortality, impacts to ongoing forest research studies, loss of visual screening and noise abatement, loss of outdoor recreational opportunities, adverse effects on some species of wildlife through food loss and changes in habitat, and degradation of forest aesthetics. In addition, some people suffer an allergic reaction when in contact with caterpillars.

Changes in tree species diversity, age class distribution, and general health and vigor are affected by gypsy moth defoliation. Heavy feeding causes defoliation, which weakens trees and increases their vulnerability to other insects and diseases that may kill them (USDA 1995, Vol., II, p. 1-4). Spruce, pine, and hemlock can die after one heavy defoliation. The forest trees preferred by this insect are oaks. Trees that are defoliated in excess of 60 percent normally refoliate the same growing season. Such events cause the trees to expend valuable energy reserves to refoliate, and consequently cause the trees' health to deteriorate. Depending on the condition of the trees at the time of defoliation, reduced growth, mast abortion, branch dieback or in some cases tree mortality, has occurred following a single year of heavy defoliation. Should subsequent

defoliation occur the following year, the impact is compounded. Trees that receive light-moderate defoliation (< 60 percent) are not likely to refoliate and there is probably no significant impact other than a reduction in growth, reduction of mast and possibly some minor branch dieback.

Trees at greater risk are those that are presently stressed from other factors, such as soil compaction from roads, sidewalks, parking lots, machinery and/or heavy foot travel, over maturity, drought, shock due to recent timber cutting activities, previous year(s) defoliation, and other insect and disease related problems. A severe drought was experienced in this portion of Maryland during the summer months in 2002.

The Allegheny National Forest (1988), the West Virginia Division of Forestry (1997) and the Cuyahoga Valley National Park (2002) provide examples of potential tree mortality. On the Allegheny National Forest, in untreated stands consisting of 40-80 percent oak, the average loss of basal area (mainly oaks) was about 16 percent (range 3-28) following one year of defoliation and 26 percent (range 10-43 percent) after two consecutive years of defoliation. In a 1986 study area in eastern West Virginia where oak species accounted for 63-78 percent of the species composition, a loss of 25 percent of the total oak sawtimber and 14 percent of the total oak poletimber occurred after one year of moderate to heavy defoliation. At Cuyahoga Valley National Park following one year of heavy defoliation, significant mortality occurred in approximately 25 percent of the defoliated areas. In the mortality areas, oak mortality ranged from 22-98 and averaged 54 percent. In these examples, drought conditions likely contributed to the level of mortality.

Significant gypsy moth defoliation occurred in this area in 1989-1991. Gypsy moth populations declined in the mid to late 1990s, due to successful suppression projects, natural population fluctuations, but in a larger part to the high incidence of the gypsy moth fungus, *Entomophaga maimaiga*. In 2002, defoliation occurred on 58 acres on PRR property. Even though the fungus is present in this general area, the impact of the disease in 2003 cannot be predicted.

During the fall of 2002, USDA Forest Service field crews surveyed the forestlands at PRR, BARC, JJRTC, NPMC, NPGBL, and GSFC. The purpose of the surveys was to estimate gypsy moth egg mass densities on a per acre basis, which is used to predict the amount of defoliation expected in 2003. Egg mass densities are at levels to cause noticeable defoliation on approximately 2, 782 acres at PRR (USDA, Forest Service, Biological Evaluation of Gypsy Moth at Patuxent Wildlife Research Center 2002), 986 acres at BARC (USDA, Forest Service, Biological Evaluation of Gypsy Moth at Beltsville Agricultural Research Center 2002), and 266 acres combined at JJRTC, GSFC, NPMC, and NPGBL (USDA, Forest Service, Biological Evaluation at James J. Rowley Training Center, Goddard Space Flight Center, National Plants Materials Center and National Plant Germplasm and Biotechnology Laboratory 2002).

Treatment areas were selected based on the biological data from these surveys and the management objectives of each site.

Should any of these sites choose no action, resident gypsy moth populations would counteract the control measures of the other Federal neighbors by allowing the forests of their site to become a source of future infestations.

The need for action specific to each site is discussed below.

USDI, Fish and Wildlife Service, Patuxent Research Refuge:

The PRR's forest resources make up a large proportion of the largest contiguous tract of forest left in the coastal plain of central Maryland. PRR is divided into three distinct Research Natural Areas as follows: Bottomland Hardwood Forest, Terrace Forest, and Upland Forest.

Each Research Natural Area is on the national registry with the Society of American Foresters. Each is managed in a "as is" manner and represents extremely valuable habitats for current ongoing research studies. Much of the forest is made up of highly susceptible tree species consisting of a variety of oaks.

Current non-native gypsy moth populations at PRR threaten: to disrupt the Refuge's long-term resource management objective to preserve and maintain the pristine nature of the existing forest community, to disrupt programs of research and monitoring of long-term ecological monitoring within a developed landscape, and to have adverse impacts on other current ongoing research studies, on some species of wildlife through food loss and changes in habitat, and on the aesthetic experience of visitors to PRR.

USDA, Agricultural Research Service, Beltsville Agricultural Research Center:

The BARC facility is owned and operated by the USDA and is dedicated to conducting basic and applied agricultural research. Research assures the best quality and supply of food and fiber (leather, cotton, wool, timber).

The area consists predominantly of hardwood forests with numerous openings and fields. Much of the forest is made up of highly susceptible tree species consisting of a variety of oaks.

Gypsy moth defoliation at BARC would impact existing forest communities, disrupt research programs, and adversely impact visitor experiences.

U. S. Department of Treasury, U.S. Secret Service, James J. Rowley Training Center:

The majority of the tree species at this facility are susceptible to gypsy moth defoliation and consequent tree mortality. The loss of this natural buffer area would adversely affect this facility's seclusion and training opportunities that it presently offers. Tree mortality would increase human exposure to hazard trees. Many training activities take place outside, and certain people suffer an allergic reaction when in contact with the caterpillars.

USDA, Natural Resources Conservation Service, National Plant Materials Center:

The National Plant Materials Center (NPMC) activities are concerned with developing plants and technology to conserve natural resources in the Mid-Atlantic region. The area consists predominantly of hardwood forests with numerous openings and fields. Much of the forest is made up of highly susceptible tree species consisting of a variety of oaks. The proposed areas of treatment on NPMC property are not currently used for active research by the NPMC and are primarily maintained as a forested watershed resource. However, other agencies, such as US FWS, and groups, such as University of Maryland, utilize the site for periodic research or surveys.

Gypsy moth defoliation at NPMC would impact existing forest communities, disrupt research studies, and adversely impact visitor experiences.

USDA, Animal and Plant Health Inspection Service, National Plant Germplasm and Biotechnology Laboratory:

The mission of the National Plant Germplasm and Biotechnology Laboratory is to safeguard American agriculture and natural resources by developing and adapting technology to detect, identify, and differentiate exotic plant pathogens, pests, and weeds of quarantine significance, and through the development, approval, and oversight of quarantine testing protocols and programs for high risk prohibited plants and materials subject to post-entry quarantine.

The majority of the tree species at this facility are susceptible to gypsy moth and consequent tree mortality. The majority of the site is forested with three upland forested classes. Deciduous forested areas are dominated by American beech, southern red oak and willow oak. Coniferous forested areas are dominated by Virginia pine and loblolly pine. The final upland forested class is a mix of the species listed above.

Forested wetlands are located in the western and northern portions of the NPGBL site. The wetland on the western portion of the site is a tributary of Beaverdam Creek. The Maryland Department of Natural Resources has designated this wetland as a "Wetland of Special State Concern". This wetland is also known as the Beltsville Airport Bog. The Maryland Natural Heritage Program database contains a record for the button sedge (*Carex bullata*), a State Threatened plant, which occurs in the Beltsville Bog.

Gypsy moth defoliation at NPGBL would impact existing forest communities, adversely affect the Beaverdam Creek and Anacostia watershed, disrupt the ongoing Forest Conservation and Long Term Protection Plan, and potentially result in a loss of visual screening and degradation of forest aesthetics.

National Aeronautics and Space Administration, Goddard Space Flight Center:

GSFC is a research and development center dedicated to expanding knowledge of the Earth and its environment, the solar system and the universe through observations from space. The majority of tree species at the Center is susceptible to gypsy moth defoliation and subsequent tree mortality. Gypsy moth defoliation at GSFC would impact both the aesthetic integrity

and the health and well-being of the Center's forest and other natural resources. Defoliation could result in a loss of visual screening and noise abatement that the forests now provide for current activities.

Based on the criteria, 4,034 acres qualify for treatment on the six Federal sites. If gypsy moth populations in the 2003 proposed treatment areas are left unchecked, sites may experience significant defoliation and perhaps, subsequent tree mortality, especially in areas that were defoliated in 2002.

1.3 Objective of the Proposed Action

The objective for the proposed 2003 gypsy moth suppression project is:

- To reduce gypsy moth populations below damaging thresholds with the least impact to non-target organisms.

This treatment objective would be evaluated by aerial defoliation surveys and post-treatment egg mass surveys.

1.4 Relationship To Other Decisions

This EA is associated with other environmental impact statements and environmental assessments. To understand the significance of this EA, it is necessary to review this relationship. When considered together, these documents provide for an understanding of cumulative environmental impacts.

The U. S. Department of Interior, National Park Service is preparing an EA for a proposed gypsy moth suppression project on approximately 414 acres on Greenbelt Park and Baltimore Washington Parkway properties.

1.4.1 Final Environmental Impact Statement

In late 1995, the USDA issued a new programmatic Final Environmental Impact Statement (FEIS) entitled, "Gypsy Moth Management in the United States: a cooperative approach" (USDA, 1995). Pursuant to the National Environmental Policy Act (NEPA), a Record of Decision (ROD) was signed in January of 1996. The alternative selected in the ROD includes all three of the gypsy moth management strategies analyzed in the FEIS--suppression, eradication, and slow the spread. NEPA demands that implementation of this alternative be preceded by a site-specific analysis (the environmental assessment) which addresses local issues. The EA provides the site-specific analysis and is tiered to the programmatic FEIS as required by the ROD.

The purpose of tiering is to eliminate repetitive discussions of the issues addressed in the FEIS (40 CFR, 1502.20 and 1508.28 in Council on Environmental Quality 1992). Thus, throughout this EA, many references to material in the FEIS will be used. This allows the EA to focus on issues specific to the action proposed by the six Federal sites.

The FEIS provides for Federal assistance by the USDA-FS to other Federal agencies for conducting gypsy moth suppression projects, including both funding and technical assistance. The selected alternative of the FEIS allows federally funded suppression projects to use the integrated pest management (IPM) approach, if site-specific analysis indicates the need to do so.

IPM includes such possible activities as spraying with chemical and biological insecticides, releasing gypsy moth predators and parasites, trapping gypsy moths using attractant chemicals, and changing forest stand composition.

The FEIS also provides (1) standard operating procedures for spray projects and associated public involvement activities, and (2) an analysis of potential environmental and human health-related effects. A copy of the FEIS is available upon request from the USDA-FS office listed in Section 1.5.

This EA fulfills site-specific planning necessary for the proposed 2003 suppression project and provides the six Federal sites with the necessary information for making a decision on the proposed project.

1.5 Decisions To Be Made

The objective of this EA is to decide how to approach the predicted consequences of the gypsy moth infestation at PRR, BARC, JJRTC, NPMC, NPGBL, and GSFC. This document is a result of a cooperative effort of seven Federal entities and was prepared jointly by representatives of the USDA FS, PRR, BARC, JJRTC, NPMC, NPGBL, and GSFC.

The decisions to be made in this EA are:

1. Would the proposed action have significant impacts requiring further analysis in an Environmental Impact Statement (EIS)?
2. Should there be a treatment program, and if so, what treatment options should be used?

The responsible officials will make these decisions on or about April 1st, 2003, to ensure timely funding for an effective gypsy moth suppression project that meets the six Federal sites' objectives. The responsible officials are as follows:

Brad Knudsen, Refuge Manager
US Fish & Wildlife Service
Patuxent Research Refuge
10901 Scarlet Tanager Loop
Laurel, MD 20708-4027

A. T. Smith, Special Agent in Charge
James J. Rowley Training Center
9200 Powder Mill Road
Laurel, MD 20708

Wayne P. Claus, Facility Manager
USDA APHIS PPQ CPHST
National Plant Germplasm & Biotechnology Laboratory
Bldg. 580, BARC-East
Beltsville, MD 20705

John W. Hazel, Field Representative
Forest Health Protection
USDA Forest Service
180 Canfield St.
Morgantown, WV. 26505-3101

Dr. Phyllis Johnson, Area Director
Beltsville Agricultural Research Center
Rm 223, Bldg 003, BARC-West
10300 Baltimore Avenue
Beltsville, MD 20705

Mr. David Doss
USDA NRCS
John Hanson Business Center
339 Busch's Frontage Rd., Suite 301
Annapolis, MD 21401-5534

A. V. Diaz
Director
NASA's Goddard Space Flight Center
Greenbelt, Maryland 20771

If no EIS is required and funding is approved, the decisions will be documented in a Decision Notice (DN) and Finding of No Significant Impact (FONSI). Following the DN and FONSI, action could be implemented as early as soon as biologically necessary.

1.6 Public Involvement and Issues

NEPA requires public involvement and notification for all projects utilizing Federal funds (40 CFR, 1506.6 in Council on Environmental Quality 1992). Procedures outlined in this section addresses the six Federal sites' compliance with those requirements.

1.6.1 Summary of Public Involvement and Notification Process

The following activities represent the actions taken for public involvement in preparation of this EA and the notification process to be used to inform the public of the pending project:

- Public Notices will be placed in local newspapers for a 14 day comment period.
- Email message describing the program, referencing a BARC Gypsy Moth Management Program Web Page, and providing contact person information. (sent 2/11/03)
- Web page on BARC Intranet describing program, providing maps showing blocks, providing links to Gypcheck information, and providing contact information. (Web page up 2/10/03)
- All facility personnel will be given a copy of the Biological Evaluation of Gypsy Moth at NPGBL for comment.
- Residents within $\frac{1}{4}$ mile of the NPMC block will be notified about the treatment to take place.
- Preliminary public notification will be provided about the proposed treatment through radio and television news releases.
- Facility personnel that might be within the proposed treatment areas will be notified prior to treatment.
- Sufficient notification will be given to allow people that are known to be present in the treatment site during spraying, such as hunters or hikers, to vacate the area.
- Newsletters, emails, and posted signs will notify facility personnel about the proposed treatment. Updates will be made available as necessary.
- Individuals with special concerns such as health issues who reside near the treatment areas and wish to be notified of when the treatment will occur will be contacted at least 48 hours prior to the start of spray operations.

1.6.2 Issues Considered in Detail

Issues and Concerns (ICs) associated with the proposed 2003 gypsy moth suppression project were solicited and identified through scoping efforts with Federal resource managers, facility employees, the local public, and information available in the FEIS. There are no newly identified issues that were received as a result of public involvement. However, the following issues have been identified as a result of internal scoping efforts.

Issue 1 - Effects of defoliation on management objectives. Discussed in Section 1.2 and 4.1.

Issue 2 - Effects of insecticides on non-target organisms. Discussed in Section 4.2 and 4.4.

Issue 3 - Security issues related to public safety in regards to Homeland Security. Discussed in Sections 2.2.6 and 4.2.

Issue 4 - Effects of low-flying aircraft on penned bird studies at PRR. Discussed in Sections 3.6 and 4.2.

Issue 5 - Human health risks associated with the aerial spraying of *Bacillus thuringiensis* (*Btk*) or Gypcheck®. Discussed in Sections 4.2 and 4.4.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

The USDA-FS and the six Federal sites considered different alternatives within the suppression management strategy, including no action, for meeting the 2003 suppression project objectives.

2.1 Alternatives Not Considered In Detail

Certain alternatives are not considered for use in 2003 because their use would not meet the goals and objectives of the project or because they are not feasible from a technical, economic, or an environmental perspective.

1. Use of non-insecticidal components of IPM, such as releasing gypsy moth predators and parasites, trapping gypsy moths using attractant chemicals, and changing forest stand composition.

These methods are not an effective means to suppress high insect populations such as those documented in the proposed treatment areas, and would not meet project objectives.

2. Aerial application of diflubenzuron (Dimilin®) to the proposed treatment area.

This alternative was ruled out because diflubenzuron (DFB), a chitin inhibitor, is an insect growth regulator (IGR) that affects a broader range of insects, and other insecticides with a narrower host range are available and would meet project objectives. Due to its mode of action, DFB can adversely affect aquatic insects and crustaceans (USDA, 1995, Vol. I, pg. 20). It is a growth regulator insecticide that kills by interfering with the normal development process (molting) of insects. The amount of DFB residue begins to diminish after spraying in the spring, but can persist on leaf surfaces into the fall. In the autumn, DFB on fallen leaves may enter streams or other water sources and subsequently affect insect leaf litter communities.

As used under routine gypsy moth suppression programs, DFB would cause no adverse human health effects to workers or to the general public. The risk of cancer associated with the use of DFB is slight, less than 1 in 1 million (USDA 1995, Vol. III, and table 9-2, USDA 1995, Vol. I, Summary page 19). In extreme exposure cases, slight changes in blood may be detectable. However, no toxicity or residual damage would be expected (USDA 1995, Vol. III, page 9-5). Only at high exposure rates could an increase in certain blood pigments be detected (USDA 1995, Vol. III, pages 6-1 to 6-37, Tables 6-1 to 6-13 and Table 9-4).

2.2 Alternatives Considered In Detail

2.2.1 Alternative 1- No Action

This alternative would allow gypsy moth populations to fluctuate naturally. It is possible that gypsy moth populations could collapse on their own due to the presence of the nucleopolyhedrosis virus (NPV) or the more recently recognized fungal pathogen, *Entomophaga maimaiga*. In areas with defoliating levels of gypsy moth populations (greater than 750 egg masses per acre) viral epizootics generally manifest themselves after significant tree defoliation has already occurred. The effect from the fungal pathogen, *Entomophaga maimaiga*, is hard to predict since it is dependent on weather conditions. Even if the fungus could cause a general collapse in 2003, it is not likely to occur prior to a significant defoliation event. Gypsy moth populations will usually peak in 2-3 years once they reach levels and then collapse as a result of NPV or fungal activity. Residual populations following such a collapse will likely remain at low densities for 3-6 years before rebuilding to defoliating levels.

2.2.2 Alternative 2 - One Aerial Application of *Bacillus thuringiensis* (*Btk*)

In this alternative, one application of *Btk* would be applied at the rate of 36 Billion International Units (BIUs) in a total mix of $\frac{1}{4}$ gallon per acre on approximately 4,034 acres. This alternative would likely provide sufficient foliage protection and prevent tree mortality, and would likely provide a sufficient reduction of gypsy moth populations. Retreatment in 2004

would probably be not necessary. However, populations of some non-target Lepidoptera species could be affected.

2.2.3 Alternative 3 - Two Aerial Applications of *Btk*

In this alternative, two aerial applications of *Btk* would be applied at the rate of 36 BIUs in a total mix of $\frac{3}{4}$ gallon per acre, applied 4-7 days apart on approximately 4,034 acres. The second application would be an attempt to increase the effectiveness of the suppression project by exposing gypsy moth caterpillars that may have survived/escaped the first application. This alternative would likely provide foliage protection, and prevent subsequent tree mortality, and reduce gypsy moth populations such that retreatment in 2004 would likely be unnecessary. However, populations of some non-target Lepidoptera species could be affected.

2.2.4 Alternative 4 - Two Aerial Applications of Gypchek®

Two aerial applications of the formulated nucleopolyhedrosis virus, Gypchek, at the rate of 2×10^{11} occlusion bodies (OB's) in a total mix of 1 gallon per acre, applied 3-5 days apart on approximately 4,034 acres. This alternative would likely provide adequate foliage protection and prevent subsequent tree mortality, and would likely provide a sufficient reduction of gypsy moth populations in most of the treatment areas. The virus is specific to gypsy moth caterpillars and has not been shown to pose a hazard to non-target organisms, either terrestrial or aquatic (USDA 1995, Vol. II, pp 4-65).

2.2.5 Alternative 5 - One Aerial Application of Gypchek® - (Proposed Action)

One aerial application of the formulated nucleopolyhedrosis virus, Gypchek, at the rate of 4×10^{11} OB's in a total mix of 1 gallon per acre on approximately 4,034 acres. This alternative achieves the same effect as Alternative 4, and significantly reduces the cost of the project.

2.2.6 Standard Application Precautions Pertaining to Human Health, Security, and Safety Issues

Standard program precautions are implemented to reduce the likelihood of adverse environmental or human health events. Specific safety procedures and guidelines are presented in the Suppression Project Work Plan and Safety Plan. Copies of the Work and Safety Plans are available from the USDA Forest Service office listed in Section 5.0.

By establishing operational and environmental parameters for aerial application, a safe, consistent, and effective spray project can be implemented while minimizing adverse non-target effects and still give the desired results. The following treatment parameters would apply:

Application Constraints

- A private aerial contractor under the supervision of USDA FS personnel would conduct pesticide spraying.
- Personnel from the USDA FS would select a treatment time to coincide with the most vulnerable larval stages of the gypsy moth.
- USDA FS personnel would ensure that application equipment is carefully checked and calibrated prior to treatment.
- Field personnel would be present in spray blocks during treatment for on-site monitoring and data collection.
- Field personnel would be in communications with airport operations to advise the project supervisor on block conditions including spray status, weather, and foliage expansion and caterpillar development.
- Several environmental parameters have been set to help ensure proper spray conditions exist within each spray site when the insecticide is applied:
 - a. Wind speeds must be 10 mph or less when measured in an open area within or near the spray block.
 - b. Inversion conditions, which produce ground fog or suspended spray, must not be present.
 - c. Air temperature should not exceed 80 degrees, or humidity falls to a point where evaporation of the insecticide

- would occur before it reaches the target area. This would normally occur when relative humidity drops below 50 percent for Gypchek®.
- d. Foliage must not be dripping wet.
 - e. No rain must be expected within 12 hours of spraying.
 - f. Spraying must be confined to daylight hours beginning at dawn and before dusk only when other operational conditions are acceptable.

- All treatment areas are delineated on 7-1/2 minute USGS topographic quadrangle maps to provide information about forest cover, topography, bodies of water, and man-made structures such as roads, buildings and power lines.
- Known hazards to aircraft operations at spraying altitude are identified and clearly marked on maps.
- A reconnaissance flight is made of each treatment area before spraying commences.
- All spray blocks are digitized for the contractor to make use of DGPS, ensuring the most accurate application as possible.
- Communications are maintained among the loading site, pilot and field crews at the spray sites with mobile and portable AM & FM two-way radios and cellular phones.

Environmental Constraints

- Application would be done over forest or forest residential areas only.
- No applications would be made over open bodies of water.
- Pilots would be instructed not to fly over bodies of water if they can be safely avoided.
- A 200-foot buffer zone would be established around the property of any person objecting to the treatment.
- Consultations with the Wildlife and Heritage Division of the Maryland Department of Natural Resources and the US Fish and Wildlife Service confirmed that no known state or federally listed threatened and endangered species or its habitat are located within the proposed treatment areas. However, “no-fly” zones have been established around a known Bald Eagle nest located in the vicinity of one treatment block and around the endangered species propagation areas at PRR. See Sections 3.6 and 4.2 for more details.

Human Health Precautions

Several precautions are used in the program to minimize exposure of the people working on the program and those in the treatment areas.

- Heavy commuter areas will be sprayed early in the morning to minimize human exposure.
- Public notification will be provided about the proposed treatment through radio and television news releases.
- Individuals with special concerns such as health issues who reside near the treatment areas and wish to be notified of when the treatment will occur will be contacted at least 48 hours prior to the start of spray operations.
- Facility personnel working within the proposed treatment areas will be notified prior to treatment.
- Precautions, such as delaying treatment, closing the area, or providing sufficient notification to allow people to vacate the area, are taken with any group of persons, such as hunters or hikers, who are known to be present in the treatment site during spraying.
- Newsletters, emails, and posted signs will notify facility personnel about the proposed treatment. Updates will be

made available as necessary.

- At the loading site, standard pesticide mixing and handling precautions are followed as specified for the material being used. Loading is by means of hose lines equipped with instantaneous shutoff valves to reduce spillage.

Procedures for containing and cleaning insecticide spills and handling aircraft and vehicle accidents are covered in the Work and Safety Plans. A copy of the Work and Safety Plans would be at the loading site and copies are given to all field crews.

Homeland Security Issues

Due to the September 11th disaster in 2001, the following measures would be taken to insure public safety from potential terrorist acts while implementing this project.

Materials Handling Pre-Delivery

Manufacturer of the product would be held accountable and responsible for the manufacturing of the material being used for the proposed project, as well as for the pre-delivery of the product. Transportation of the product to be used on the project would be sub-contracted to a carrier that is insured and responsible for the security, proper handling, and shipping of the material from the manufacturer to the project base location.

Should Gypchek® be selected for use, USDA Forest Service personnel would be responsible for the shipping, handling, and security of the Gypchek® product.

Materials On-Site

On-site storage of products to be used on this project will be kept secured at all times which includes operational periods and non-operational periods. The material will be secured in a facility established by the receiving agency to ensure the safety of the material. Only authorized personnel will have access to the storage area.

Handling of the product will be done only by trained, authorized personnel, using appropriate protective equipment. Containers will only be opened just prior to application.

Security of aircraft fuel will be the responsibility of the contractor.

Aircraft

Contractors must abide by any current FAA regulations with regard to aircraft and insecticide safeguarding and security, as well as any rules and/or recommendations issued by the National Association of Aerial Applicators, the USDA Forest Service, USDOT Federal Aviation Administration, or any other responsible agency.

Waivers from the FAA to fly aircraft within the Temporary Flight Restriction (TFR) area within 15 miles from the Washington D.C. VOR will be acquired.

The spray aircraft must be disabled when not in use to prevent it from being started by anyone other than authorized personnel. The aircraft's spray tanks will have locking devices for when aircraft is not in use.

The aircraft will be inspected upon arrival for weapons, explosives, etc. Contractor personnel IDs will be checked. The mix truck tanks will be inspected to verify that it is locked and mix tank will be inspected to verify it is empty. Spray system will be checked and flushed with water prior to use.

There will be communications with the aircraft at all times. All project personnel will have access to some form of communications, in order to report any suspicious behavior that may lead to unsafe conditions.

Chain-of-Custody

At all times, a Chain-of-Custody will be established and documented to provide a blueprint of personnel/organizations responsible at any given time, for the movement and handling of the material from manufacturer to the base of operations and during applications.

3.0 AFFECTED ENVIRONMENT

The purpose of this section is to present baseline information on the existing environment for the purpose of comparing environmental consequences in section 4.0. This chapter does not present any of the effects of the alternatives.

3.1 Host Vegetation

The upland forests of the proposed treatment areas are dominated by white, red, and southern red oak (*Quercus alba*, *rubra*, and *falcata*), with occasional scrub pine (*Pinus virginiana*), red maple (*Acer rubrum*), and black gum (*Nyssa sylvatica*). The lowland areas are characterized by river birch (*Betula nigra*), pin oak (*Q. palustris*), swamp white oak (*Q. bicolor*), red maple (*A. rubrum*), sweet gum (*Liquidamber styraciflua*), yellow poplar (*Liriodendron tulipifera*), and in addition to the oaks already mentioned, willow oak (*Q. phellos*, black oaks (*Q. velutina*), and post oak (*Q. stellata*).

This forestland, which includes the forested areas proposed for treatment, is made up of trees that are highly to moderately susceptible to gypsy moth caterpillars (USDA 1995, Vol. II, Appendix D). None of the proposed treatment areas contain sufficient quantities of resistant tree species to provide satisfactory protection without intervention.

3.2 Geography

The proposed treatment areas are located in the Atlantic Coastal Plain physiographic province. It is underlain by unconsolidated deposits of gravel, sand, silt, and clay. The topography is mostly characterized by rolling hills and broad valleys with small streams that empty in the Anacostia and Patuxent Rivers. A 100-year floodplain runs through some of the PRR's and BARC's forest areas. Ponds and/or marshlands are present at all sites. The soil present over much of the area belongs to the Christiana-Sunnyside-Beltsville association and consists of deep, well-drained, sandy and clayey soils with a compact subsoil. Floodplain soils, which occur along some of the streams, consist of poorly-drained soils of the Bibb-Tidal marsh association.

3.3 Land Use

Patuxent Research Refuge:

Since its establishment in 1936 as the Nation's first wildlife experiment station, the Patuxent Research Refuge has been a leading international research institute for wildlife and applied environmental research. The Refuge land is owned and managed by the U.S. Fish and Wildlife Service and is co-located with the U.S. Geological Services's Patuxent Wildlife Research Center. The Refuge's 12, 800 acres straddle the Big and Little Patuxent Rivers within the critically important Chesapeake Bay watershed. Situated in the complex suburban and urban landscape of the Baltimore - Washington corridor, the Refuge's location offers significant opportunities for studying the interaction of reserved lands within a developed landscape. The Refuge provides a variety of habitats for study, including the river itself, its riparian zone, natural and constructed wetlands, forests, woodlots, ponds, penned bird complexes, old fields and maintained fields. Areas are set aside for field-scale experimentation and demonstration. Forty man-made impoundments are managed to provide optimal habitat for waterbirds. Meadows are managed to provide maximum cover and feeding area for birds, mammals, and insects. Several meadows are managed for native grasses and forbs. Plantings beneficial to wildlife abound in hedgerows, impoundments, and as landscape plantings around buildings.

Hunting and fishing are also allowed in selected areas.

Buildings are sparsely located throughout the Refuge. Family residences (8), administration, laboratories, the National Wildlife Visitor Center, and maintenance buildings round out the remaining land use.

Beltsville Agricultural Research Center:

The BARC is a diversified agricultural research complex comprising more than 7,000 acres. With the exception of three small private developments consisting of about 30 houses, there are no permanent dwellings located on the research center. However, there are about 800 buildings which are mainly occupied only during the day and which include research laboratories, greenhouses, barns, poultry houses, shops, and offices. Powder Mill Road and the Baltimore-Washington Parkway are major thoroughfares through the research center used extensively by commuters and other travelers.

Deer hunting occurs at BARC during the state hunting season.

The area consists predominantly of hardwood forests with numerous openings and fields. Much of the forest is made up of highly susceptible tree species consisting of a variety of oaks. Soils are mainly of sandy loams with areas of split loam and clay. The land varies from gently sloping to moderately sloping. BARC has experimental pastures, nurseries, orchards, gardens, fields for cultivated crops, forested ecosystems, and soil-treatment plots.

James J. Rowley Training Center:

The JJRTC offers Secret Service trainees instruction on policies and procedures associated with the dual responsibilities of investigations and protection. The core curriculum is augmented with extensive firearms training, control tactics, water survival skills and physical fitness. It is located on 490 acres east of the Baltimore-Washington Parkway, just north of Powder Mill Road. It is bordered on the north by private property, on the south by the National Agricultural Research Center, on the east and northeast by the Patuxent Research Refuge, and on the west by the Baltimore-Washington Parkway.

The facility consists of a number of large buildings, outdoor ranges, and a network of roadways, all spread throughout the complex. Approximately 300 acres of forestland presently exists at this site and is currently being managed to provide visual screening and noise abatement for security purposes.

National Plant Materials Center:

The National Plant Materials Center (NPMC) activities are concerned with developing plants and technology to conserve natural resources in the Mid-Atlantic region. The area consists predominantly of hardwood forests with numerous openings and fields. Much of the forest is made up of highly susceptible tree species consisting of a variety of oaks. Soils on the center are mainly of sandy loams with the areas of split loam and clay. The land varies from gently sloping to moderately sloping. Conservation practices are necessary to prevent erosion.

The National Plant Materials Center addresses the following priority resource issues: reservation and restoration of the Chesapeake Bay; development of information on native species for restoration and conservation activities; establishment of vegetation in created or enhanced wetlands; improving soil, water, and air quality near agricultural operations; development of local ecotypes of native grasses for restoration activities. Hunting of white-tailed deer is also allowed in selected areas.

Areas of the NPMC in active use are utilized for plant research, demonstration, and increase of germplasm. The proposed area of treatment is not actively used by the NPMC for these purposes. This area is primarily conserved as forested seasonal wetlands. Parts of the area are periodically flooded. The area is used occasionally by other agencies and groups, such as the USFWS for bird surveys, the NRCS for soil profile training sessions, by the University of Maryland for insect studies, and by BARC for restricted hunting/deer management.

National Plant Germplasm and Biotechnology Laboratory:

The National Plant Germplasm and Biotechnology Laboratory safeguards agriculture and natural resources from risks associated with the entry, establishment, or spread of exotic plant diseases associated with foreign germplasm to be introduced into the United states. The Center provides diagnostic support for federal exotic-pest emergency and quarantine programs, as well as developing in-field, rapid, user friendly diagnostic tools for plant pest/pathogen identification at ports

of entry. Fulfillment of these safeguarding functions facilitates the APHIS-PPQ mission to ensure an abundant, high-quality, and varied food supply; strengthen the marketability of U.S. agriculture in domestic and international commerce; and contribute to the preservation of the global environment.

NPGBL is located in Beltsville, MD and occupies 127.9 acres in Prince George's County. The facility is bordered to the north by Powder Mill Road, to the west and south by the Beltsville Agricultural research Center (BARC) and to the east by the Patuxent Research Refuge. NPGBL occupies approximately 11 acres containing 25 buildings: greenhouses, ranges, quarantine screenhouses, Inspection Station, Virology laboratory, Administrative/Support building, Mechanical Support and a BSL-3AG Laboratory/ Greenhouse High Containment building.

The dominant land cover is forested, totaling about 88 acres or 69 percent of the land. Three upland forested classes have been identified. Deciduous forested areas are dominated by *Fagus grandifolia*, *Quercus falcate* and *Quercus phellos*. Coniferous forested areas are dominated by *Pinus virginiana* and *Pinus taeda*. The final upland class consists of a mix of the species listed above. Approximately four percent of the NPGBL property is impervious surface, comprised of parking lots, roads, buildings and pathology/diagnostic facilities. Thus the majority of the NPGBL land use is in its natural state-a beneficial impact to the Beaverdam Creek watershed.

NPGBL has prepared a Forest Delineation and Conservation Plan to effectively manage its natural resources. The facility's forest and wetland of the NPGBL provide habitat for wildlife typical of the area, such as deer, squirrels, raccoon and various avian species. Open areas west of the developed portion of the facility are slated for the establishment of wildflower meadows. A 100-foot buffer has been maintained around the wetlands during site development. Vegetation present includes red maple, black gum, sweet gum, sensitive fern and cinnamon fern.

Goddard Space Flight Center:

GSFC is a research complex comprising more than 1200 acres. There are about 30 major buildings throughout the Center, housing office space, research laboratories, computer facilities, and operations and maintenance facilities. There are no residences located on the Center. The forested area at GSFC is currently managed for the well-being of our forest and other natural resources and for aesthetic and buffering purposes in support of ongoing activities.

3.4 Human Population Density

Patuxent Research Refuge:

The Refuge is located approximately midway between the large suburban communities of Bowie to the east and Laurel to the west. A several hundred home residential community immediately adjoins the western boundary. Fort George G. Meade adjoins the northern boundary and BARC adjoins the southern boundary. The Refuge is located in Prince George's and Anne Arundel Counties, where together with Montgomery County to the west, two-thirds of the entire statewide population resides.

Approximately 250 employees work on the Refuge. This population and buildings are spread out among the research headquarters areas on the Central Tract to the National Wildlife Visitor Center on the South Tract to the Visitor Contact Station on the North Tract. High public use occurs on both the North and Central Tracts (see map of 3 tracts in Appendix A).

Beltsville Agricultural Research Center:

Approximately 2,500 USDA employees work at BARC, almost exclusively during the daytime hours. These people are for the most part office workers, technicians, and scientists working in laboratories. Some staff and scientists conduct work out of doors. The research center contains a Visitor Center that is the only area freely accessible by the public. All other buildings and areas are restricted and require a visitor's pass. No buildings are within any of the proposed spray blocks.

James J Rowley Training Center:

During a normal workday, approximately 110 staff are at the facility, with a varying number of students on-site on any given training day. Training outdoors is very common almost on a daily basis. In addition, a number of private contractors are on-site during the week and occasionally on weekends, working indoors and outdoors. There are no permanent residences on the facility.

National Plant Materials Center:

Approximately 7 full-time staff and 5 part-time staff or volunteers report for work Monday through Friday at the facility. Outdoor work on a daily basis is common. There are 9 buildings on the property, one of which is a permanent residence. There are no buildings located in the proposed treatment area. Employee access to the proposed treatment area is limited and periodic.

National Plant Germplasm and Biotechnology Laboratory:

Approximately 45 employees and contractors work at NPGBL on a daily basis. Scientist and technicians routinely work after-hours and on weekends. The facility which occupies 11 acres contains 25 buildings: Quarantine greenhouses, quarantine screenhouses, an Inspection station, Virology/Pathology building, Administrative/Support, Mechanical/Support, and a BSL-3AG Laboratory/Greenhouse High containment building. There are no permanent residences on the facility.

Goddard Space Flight Center:

About 7,600 employees work at GSFC, consisting of civil servant and contractors. Among the employees are scientists, engineers, technicians, administrative staff and operations and maintenance personnel. The forested area proposed for treatment does not include any buildings or research activities. Located outside of the treatment block to the south are several buildings.

3.5 Non-Target Organisms within Proposed Treatment Areas

Organisms other than gypsy moth are not intended to be affected by spraying but may be in the area during treatment and include:

- 1) Outdoors pets such as cats, dogs, and rabbits
- 2) Many species of insects, spiders and other organisms
- 3) Various species of wild birds such as orioles, woodcock, whip-poor-wills, crows, bluejays, sparrows, warblers, woodpeckers, quail, turkeys, hawks, owls, and other species of raptors and songbirds
- 4) Small and large species of wildlife such as mice, rabbits, foxes, raccoons, squirrels and deer
- 5) Species of game and non-game fish in streams, tributaries, and impoundments
- 6) Many species of aquatic insects, reptiles and amphibians, and other organisms in the streams, tributaries, and impoundments

3.6 Threatened and Endangered Species

The Wildlife and Heritage Division of the Maryland Department of Natural Resources provided information on the presence of Federal and State designated endangered, threatened, and potentially threatened species. The US Fish and Wildlife Service (USF&WS) was contacted about the impacts of the proposed treatments on federally listed endangered or threatened species (Appendix B). The proposed project is not anticipated to negatively impact any threatened or endangered species in the proposed treatment areas. Some proposed areas are near a known bald eagle nest. A

“no fly zone” with a minimum radius of at least ¼ mile (1320 feet) will be designated around the nest. The endangered species propagation area at PRR will have a “no fly zone” with a minimum radius of at least 1/2 mile (2640 feet).

3.7 National Historic Places

The National Historic Preservation Act provides specific guidance for the preservation of prehistoric and historic resources when Federal actions may have an adverse impact on these resources. None of the 2003 proposed treatment areas contain any known registered National Historic Places. However, at GSFC there is a historic archeological site within the treatment area but it is not eligible for listing on the National Register of Historic Places.

3.8 Wetlands and Floodplains

NPGBL has forested wetlands that are located in the western and northern portions of the site and are within the treatment block. The wetland on the western portion of the site is a tributary of Beaverdam Creek and extends from Powder Mill Road south beyond the limits of the NPGBL. The Maryland Department of natural resources has designated this wetland as a “Wetland of Special State Concern”. This wetland is also known the Beltsville Airport Bog.

Located on the Patuxent Research Refuge are the Big Patuxent River and Little Patuxent River watersheds, which are part of the critically important Chesapeake Bay watershed. Located within the treatment areas at PRR are streams and marshlands.

GSFC has a small wetland area located in one of the treatment blocks and larger wetland areas are located nearby.

BARC has marshes and streams within treatment blocks.

The proposed treatment area at NPMC is conserved as forested seasonal wetlands.

4.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

This section provides the scientific and analytical basis for comparing the alternatives described in Section 2.0. It includes the direct, indirect, short-term, long-term, beneficial, adverse, and cumulative potential impacts linked to the issues discussed in Section 1.6.2.

4.1 Alternative 1 (No Action)

Under this alternative, no suppression project would take place. Noticeable defoliation would likely occur on approximately on 4,034 acres on PRR, BARC, JJRTC, NPMC, NPGBL, and GSFC.

Issue 1. Effects of defoliation on management objectives.

The environmental consequence of areas not receiving treatment would, in most cases, allow defoliation of the host type. Defoliation can result in physiological stress, making trees susceptible to drought, or other pest attacks. The short-term, direct, adverse effects of defoliation include (USDA 1995, Vol. I, pp. 14-17):

- increased skin rashes due to contact with caterpillars
- caterpillars and frass staining buildings and sidewalks
- elimination of oak mast production
- loss of shade
- loss of aesthetics
- increased fire danger due to solar drying of exposed leaf litter
- increase in water temperatures and water yield, effecting water quality

- increase in tree mortality

The short-term, indirect, adverse effects of defoliation on animals include (USDA 1995, Vol. IV, pp. 2-14 to 2-43):

- reduction of squirrel and deer populations due to loss of oak mast
- reduction in abundance of insects
- reduction in food supply for song birds
- increase in nest predation of songbirds due to lack of cover
- decrease in populations of small mammals
- decrease in oxygen levels in small streams as a result of decomposition of leaf litter and caterpillar excrement, resulting in increase nitrogen and algae, effecting overall water quality.
- decline of some species of fish, small crayfish and snails from small streams
- increase in nesting failure of turkeys
- migration of turkey, deer, and bats to undefoliated areas

Since tree mortality can happen over a time period of one year or greater, it can be considered either as a short-term or long-term, cumulative effect. The direct and indirect, adverse effects of mortality include (USDA 1995, Vol. I, pp. 14-16):

- decrease in property value
- increase safety hazard due to dead trees
- permanent loss of shade in residential areas
- reduction or elimination of squirrel populations
- decline in tree nesting birds
- decline in moths and butterflies that require oak dominant forest canopies
- replacement of dead trees by species less desirable to gypsy moth (i.e. red maple, pines, etc..)
- expense of tree removal and replanting in residential areas

In un-inhabited forested areas, there may be some beneficial effects of gypsy moth defoliation and mortality, but this greatly depends upon the management objectives (timber, wildlife, or recreation) for these areas. The potential direct and indirect beneficial effects of gypsy moth defoliation and mortality include (USDA 1995, Vol. I, pp. 14-16):

- increase in gypsy moth parasites
- increase in numbers and types of birds
- increase in production of berries and other fruit should shrubs and herbaceous plants increase
- increase in some species of insects that do not require a closed canopy
- increase in exposure of forest floor to sunlight which could increase biological productivity
- increase in standing dead trees would provide cavity nests and den sites for animals and birds
- increase in numbers and types of pollinators in response to a greater variety within the plant community
- forests would become less susceptible to feeding by the gypsy moth

Most the effects of defoliation as described above would have negative impacts on a multitude of individual site management objectives such as, visual screening, noise abatement, tree mortality and hazard tree prevention, ongoing forest research studies, certain wildlife and forest management activities, and most outdoor recreational opportunities. Defoliation could also have negative indirect impacts on non-target species by reducing food sources and causing habitat losses. See Section 1.2 for more detailed site management objectives.

Issue 2. Effects of insecticides on non-target organisms.

Identified issue not applicable.

Issue 3. Security Issues related to public safety in regards to Homeland Security.

Identified issue not applicable.

Issue 4. Effects of low-flying aircraft on penned bird studies at PRR.

Identified issue not applicable.

Issue 5. Human health risks associated with the aerial spraying of *Bacillus thuringiensis (Btk)* or Gypchek®.

Identified issue not applicable.

4.2 Alternative 2 - One aerial application of *Btk*

Under this alternative, a total of 4,034 acres of Federal forestland would be treated with *Btk*. Caterpillar and foliage development would be monitored to insure proper timing of the application. Successful treatment would meet most site management objectives by providing sufficient foliage protection with little or no tree loss. Problems associated with larval nuisance would be reduced. If this alternative was implemented, populations of some non-target Lepidoptera species present at the time of treatment could be affected.

Issue 1. Effects of defoliation on management objectives.

Identified issue not applicable.

Issue 2. Effects of insecticides on non-target organisms.

The direct, adverse, short-term effects of *Btk* on non-target organisms include:

•Butterflies and moths

Btk is a bacterium that has insecticidal activity only against caterpillars of moths and butterflies. *Btk* must be ingested by caterpillars, is short-lived in the environment, and only directly affects caterpillars on foliage at the time of application or shortly thereafter. Permanent changes in nontarget caterpillar populations are not likely following suppression, which usually consists of a single application of *Btk* (USDA 1995, Vol. 1, p. 18). In a three-year study in eastern West Virginia with one application of *Btk* at 24 BIU/ac, researchers found a significant reduction in the abundance and numbers of non-target caterpillar species in the treatment year but not the following year (Sample et al., 1996). Only early season (spring) feeding caterpillars are affected (USDA 1995, Vol. II, p. 4-52) and the effectiveness of *Btk* declines rapidly after application, normally lasting from 7-14 days (USDA 1995, Vol. II, p. 4-53).

The indirect, adverse, short-term effects of *Btk* on non-target organisms include:

•Gypsy Moth Parasites

Field studies on the effect of *Btk* on gypsy moth parasites have yielded somewhat variable results, but effects are indirect, through the reduction of its host species (USDA 1995, Vol. IV, pp. 5-6 to 5-7).

•Other Non-target Insects

Btk does not affect sawfly caterpillars or the overall abundance of "clinging" insects, including beetles, sucking insects such as aphids, leafhoppers, or cicadas, and spiders (USDA 1995, Vol. II, p. 4-52). *Btk* may affect some soil invertebrates, but additional research is needed to determine what effects, if any, this might have on rates of soil decomposition (USDA 1995, Vol. 1, p. 19).

•Birds and Mammals

Studies have shown that *Btk* has no direct effects on vertebrates in the forest, but may have indirect, adverse effects on their food supply. For birds, the number of nesting attempts per year may be reduced but not necessarily overall production of

fledglings in the year of treatment or subsequent years (Roddenhouse and Holmes, 1992). Bats that feed on night flying moths in summer may have to expand their foraging territories or adjust their foraging habits temporarily (USDA 1995, Vol. 1, p. 18).

•Aquatics

Btk does not adversely affect the abundance or number of species of aquatic insects, plants, or fish (USDA, 1995, Vol. IV, pp. 5-19 to 5-20).

The potential beneficial, direct, and indirect effects of *Btk* treatments include: (USDA 1995, Vol. 1 pp. 18-19).

- Protecting the foliage
- Reducing the likelihood of adverse changes in water quality that might be associated with feeding of gypsy moth
- Maintaining the forest condition (species composition)
- Reducing gypsy moth populations

Issue 3. Security Issues related to public safety in regards to Homeland Security.

Due to the September 11th disaster in 2001, potential terrorist acts such as, biological/chemical contamination, and caused-crashes into buildings and populated areas while implementing this project could be a viable issue.

Contaminates, either biological or chemical, could be placed into the material at any point from the time it leaves the manufacturer to the actual application of the insecticide. This mixture could be dispersed as the aircraft would be applying the insecticide.

Terrorists could gain control of and use the aircraft to crash into buildings or populated areas.

Specific precautionary measures that will be instituted to address this issue are discussed in Section 2.2.6.

Issue 4. Effects of low-flying aircraft on penned bird studies at PRR.

Noise from low-flying aircraft (helicopter or fixed-wing) could seriously frighten penned birds in breeding colonies, and endangered species propagation units (Mississippi sandhill crane and the whooping crane). None of these areas are adjacent to proposed treatment areas, but concern is for the aircraft flying over the areas at low altitude during reconnaissance or ferrying to and from the treatment areas and the base of operation. It has been well documented that stress associated with low-flying aircraft noise can cause cranes to behave abnormally, sometimes killing their young and attacking each other. Immediate fright responses can cause penned birds to injure themselves. At the time of spraying, cranes will be in late incubation and hatching, a critical phase in their nesting chronology.

To address this concern, no aircraft will be permitted to fly within 2,640 feet (1/2 mile) of the propagation unit area. During the 1990-1991 spray programs, a 1,000 feet minimum "no fly zone" was established and proved to be adequate.

Issue 5. Human health risks associated with the aerial spraying of *Bacillus thuringiensis* (*Btk*).

An extensive analysis of this issue is available in the Human Health Risk Assessment of the FEIS (USDA 1995, Vol. III). *Btk* is a naturally occurring bacterium that has insecticidal activity against gypsy moth and other Lepidoptera (moths and butterflies). It is nontoxic to humans and it is highly unlikely to pose a hazard to human health when properly applied (USDA, 1995, Vol. III, pp. 4-1 to 4-21).

Only persons handling and loading the insecticide would be the most likely to experience any effects, which could consist of minor irritation of the skin, eyes or respiratory tract. Persons loading and handling concentrated *Btk* are required to read and follow all label precautions. Public and handler exposure would be minimized by adherence to standard human health precautions. Based on the available epidemiological studies and the long history of its use, there is no evidence that the application of *Btk* formulations causes adverse effects in the general public (USDA 1995, Vol. III, p. 4-15).

4.3 Alternative 3 - Two Aerial Applications of *Btk*.

Two aerial applications of *Btk*, as in Section 4.2, applied 4-7 days apart. The second application would be an attempt to increase the effectiveness of the suppression project by exposing gypsy moth caterpillars that may have survived/escaped the first application. Successful treatment would meet most site management objectives by providing sufficient foliage protection with little or no tree loss. Problems associated with larval nuisance would be greatly reduced. If this alternative was implemented, populations of some non-target Lepidoptera species present at the time of both treatments could be affected.

Issue 1. Effects of defoliation on management objectives.

Identified issue not applicable.

Issue 2. Effects of insecticides on non-target organisms.

Same as in Section 4.2, except for the extended period of time the non-target organisms could be exposed to the insecticide.

Issue 3. Security Issues related to public safety in regards to Homeland Security.

Same as in Section 4.2, except for the period of time for the project would be extended and thus providing for more opportunity of possible terrorist acts to occur.

Issue 4. Effects of low-flying aircraft on penned bird studies at PRR.

Same as in Section 4.2.

Issue 5. Human health risks associated with the aerial spraying of *Bacillus thuringiensis* (*Btk*).

Same as in Section 4.2.

4.4 Alternative 4 - Two Aerial Applications of Gypchek®.

Under this alternative, a total of 4,034 acres of Federal forestland would be treated with two applications of Gypchek®, at the rate of 2×10^{11} OB's in a total mix of 1 gallon per acre, applied 3-5 days apart. The second application would be an attempt to increase the effectiveness of the suppression project by exposing gypsy moth caterpillars that may have survived/escaped the first application. Caterpillar and foliage development would be monitored to insure proper timing of the application. Successful treatment would meet most site management objectives by providing sufficient foliage protection with little or no tree loss. Problems associated with larval nuisance would be greatly reduced. Gypchek® is host specific to the gypsy moth. No impact to other organisms is expected to occur.

Issue 1. Effects of defoliation on management objectives.

Identified issue not applicable.

Issue 2. Effects of insecticides on non-target organisms.

Gypchek® is the formulated nucleopolyhedrosis virus and is registered and available in limited quantities. This product is not available commercially but is produced in limited quantities by a cooperative effort of the USDA Forest Service and the Animal Plant Health Inspection Service (APHIS). Normally the virus reaches epizootic proportions when gypsy moth populations reach high densities as a result of increased transmission within and between gypsy moth generations. The application of Gypchek® to gypsy moth populations simply expedites this process by increasing the exposure of the virus at an earlier stage. Healthy, feeding gypsy moth caterpillars become infected by ingesting contaminated foliage and soon stop feeding and die. Due to the limited supply, priority is first given to State and Federal cooperators that need to deal with

Federally listed threatened and endangered species associated with gypsy moth treatments. However, there are sufficient quantities of Gypchek® currently available for 2003 should this insecticide be preferred for use at these sites.

The gypsy moth virus is not known to directly affect organisms other than the gypsy moth, and no change in nontarget species or their populations is likely from the use of Gypchek® (USDA 1995, Vol. I, p. 22). Gypsy moth parasitoids may be indirectly affected by the loss of their host (USDA 1995, Vol. I, p. 22).

Gypchek® has no direct effects on vertebrates in the forest, but may have indirect, adverse effects on their food supply and may temporarily switch their diet.

The potential beneficial, direct, and indirect effects of Gypchek treatments include: (USDA 1995, Vol. I p. 22).

- Protecting the foliage
- Reducing the likelihood of adverse changes in water quality that might be associated with feeding of gypsy moth
- Maintaining the forest condition (species composition)
- Reducing gypsy moth populations

Issue 3. Security Issues related to public safety in regards to Homeland Security.

Same as in Section 4.2, except for the period of time for the project would be extended and thus providing for more opportunity of possible terrorist acts to occur.

Issue 4. Effects of low-flying on penned bird studies at PRR.

Same as in Section 4.2.

Issue 5. Human health risks associated with the aerial spraying of Gypchek®.

Gypchek is a naturally occurring virus that has insecticidal activity against only the gypsy moth. As with *Btk*, it is nontoxic to humans and it is highly unlikely to pose a hazard to human health when properly applied (USDA 1995, Vol. III. Pp. 5-1 to 5-12).

Irritation of the eyes, skin, and respiratory tract is possible from the exposure to Gypchek. Because Gypchek contains gypsy moth parts, irritant effects might be similar to those caused by the gypsy moth itself. Individuals with allergies may be at greater risk of developing irritation. Workers are more likely to be affected than the general public because their exposure will be higher (USDA 1995, Vol. I, p. 21).

4.5 Alternative 5 - One Aerial Applications of Gypchek® - (Proposed Action)

One aerial application of the formulated nucleopolyhedrosis virus, Gypchek®, at the rate of 4×10^{11} OB's in a total mix of 1 gallon per acre on approximately 4,034 acres. This is the same as alternative 4, but at a higher dosage rate and applied only once. Project costs would be almost half the cost of alternative 4. Successful treatment would meet most site management objectives by providing sufficient foliage protection with little or no tree loss. Problems associated with larval nuisance would be greatly reduced. Gypchek® is host specific to the gypsy moth. No impact to other organisms is expected to occur.

Issue 1. Effects of defoliation on management objectives.

Identified issue not applicable.

Issue 2. Effects of insecticides on non-target organisms.

Same as in Section 4.3.

Issue 3. Security Issues related to public safety in regards to Homeland Security.

Same as in Section 4.2.

Issue 4. Effects of low-flying on penned bird studies at PRR.

Same as in Section 4.2.

Issue 5. Human health risks associated with the aerial spraying of Gypchek®.

Same as in Section 4.4.

4.6 Comparative Summary of Each Alternative and the Consequences

	Alternative 1 No Action	Alternative 2 and 3 <i>Btk</i> Treatments	Alternative 4 and 5 Gypchek® Treatments
Issue 1 Effects of defoliation on management objectives.	Noticeable defoliation would occur and have negative impacts on a multitude of individual site management objectives and non-target organisms. See Section 1.2 and 4.1.	N/A	N/A
Issue 2 Effects of insecticides on non-target organisms	N/A	<i>Btk</i> would likely adversely affect some nontarget Lepidoptera species in the treatment areas. However, this impact would likely be short-term since <i>Btk</i> declines rapidly in the environment (7-14 days). See Section 4.2.	Gypchek® is host specific to the gypsy moth. No impact to other organisms is expected to occur. See Section 4.4.
Issue 3 Security issues related to public safety in regards to Homeland Security	N/A	Terrorist acts, such as, biological/chemical contamination, and caused-crashes into buildings and populated areas. Extra measures would be taken to insure public safety. See Section 2.2.6.	Terrorist acts, such as, biological/chemical contamination, and caused-crashes into buildings and populated areas. Extra measures would be taken to insure public safety. See Section 2.6.6.
Issue 4 Effects of low flying aircraft on penned bird studies at PRR	N/A	Noise from aircraft disturbing birds and causing potential harm to birds. Minimum 1/2 mile (2640 feet) radius "no fly zone" established around this area.	Noise from aircraft disturbing birds and causing potential harm to birds. Minimum 1/2 mile (2640 feet) radius "no fly zone" established around this area.
Issue 5 Human health risks associated with the aerial spraying of <i>Bacillus thuringiensis</i> (<i>Btk</i>) and Gypchek®	N/A	Based on the available epidemiological studies and the long history of its use, there is no evidence that the application of <i>Btk</i> formulations causes adverse effects in the general public (USDA 1995, Vol. III, p. 4-15). See Section 4.2.	Gypchek is nontoxic to humans and it is highly unlikely to pose a hazard to human health when properly applied (USDA 1995, Vol. III. Pp. 5-1 to 5-12). See Section 4.4.

4.7 Irreversible and Irretrievable Commitment of Resources

Irreversible commitments are those that cannot be reversed (e.g. when a species becomes extinct), except perhaps in the extreme long term (e.g. removing an old growth western forest). Irretrievable commitments are those that are lost for a long period of time. It is doubtful that any of the alternatives would lead to any irreversible commitment of natural resources. However, if alternative 1 were selected, some tree mortality would probably occur. This could be considered irretrievable since it takes eastern hardwood forests to grow to maturity in 80 to 100 years.

5.0 LIST OF PREPARERS

Holliday Obrecht III, Wildlife Biologist
Patuxent Research Refuge
US Fish and Wildlife Service
12100 Beech Forest Road
Laurel, MD 20708-4036

Charles Homfeld, Facilities Manager
James J. Rowely Training Center
9200 Powder Mill Road
Laurel, MD 20708

Wayne Claus, Facilities Manager
National Plant Germplasm and Biotechnology Laboratory
APHIS-PPQ-NPGLB
BARC-EAST
BLDG 580
Beltsville, MD 20705

Lizabeth Montgomery
NASA Goddard Space Flight Center
Code 205.2, Safety and Environmental Branch
Greenbelt, MD 20771

Karen Felton, Biologist
Forest Health Protection
USDA Forest Service
180 Canfield Street
Morgantown, WV 26505

Kevin Thorpe, Research Entomologist
Beltsville Agricultural Research Center
Rm. 214, Bldg. 011A, BARC-West
10300 Baltimore Ave.
Beltsville, MD 20705

John Englert, Manager
USDA-NRCS, National Plant Materials Center
BARC – EAST, Building 509
Beaver Dam Road
Beltsville, MD 20705

Darlene Squibb, Environmental Protection Specialist
NASA Goddard Space Flight Center
Code 205.2, Safety and Environmental Branch
Greenbelt, MD 20771

Brad Onken, Entomologist
Forest Health Protection
USDA Forest Service
180 Canfield Street
Morgantown, WV 26505

6.0 LIST OF AGENCIES AND PERSONS CONSULTED

Maryland Department of Natural Resources, Wildlife and Heritage Division
U.S. Fish and Wildlife Service
USDA Forest Service

7.0 LITERATURE CITED

Allegheny National Forest, Warren, PA. 1988. Gypsy moth caused oak mortality – Allegheny National Forest, 1988. USDA Forest Service internal report prepared by Forest Management staff, Morgantown, WV Unp.

Council on Environmental Quality. 1992. Regulations for implementing the procedural provisions of The National Environmental Policy Act. 40 CFR Parts 1500-1508. Washington, DC; 46 p.

Cuyahoga Valley National Park, Brecksville, OH. 2002. Oak Mortality Evaluation. Cuyahoga Valley National Park, 2001. USDA Forest Service Internal report prepared by Forest Health Protection staff, Morgantown, WV. Unp.

FEIS (See United States Department of Agriculture 1995)

ROD (United States Department of Agriculture, 1996)

Rodenhouse, N. and R. Holmes. 1992. Results of experimental and natural food reductions for breeding black-throated blue warblers. *Ecology*. 73 (1): 357-372.

Sample, B., L. Butler, C. Zivkovich, R. Whitmore, and R. Reardon. 1996. Effects of *Bacillus thuringiensis* and defoliation by the gypsy moth on native arthropods. *Can. Entomol.* 128: 573-592.

United States Department of Agriculture, 1995. Gypsy Moth Management in the United States, A Cooperative Approach. Final Environmental Impact Statement. 1995 United States Department of Agriculture, Forest Service, Washington, DC.

United States Department of Agriculture, Forest Service, Whiteman, Rodney L. and Bradley P. Onken. December 2002. Biological Evaluation of Gypsy Moth at Beltsville Agricultural Research Center 2002. Internal report prepared by Forest Health Protection staff, Morgantown, WV. Unp.

United States Department of Agriculture, Forest Service, Whiteman, Rodney L. and Bradley P. Onken. January 2003. Biological Evaluation of Gypsy Moth at James J. Rowley Training Center, Goddard Space Flight Center, National Plants Materials Center and National Plant Germplasm and Biotechnology Laboratory 2002. Internal report prepared by Forest Health Protection staff, Morgantown, WV. Unp.

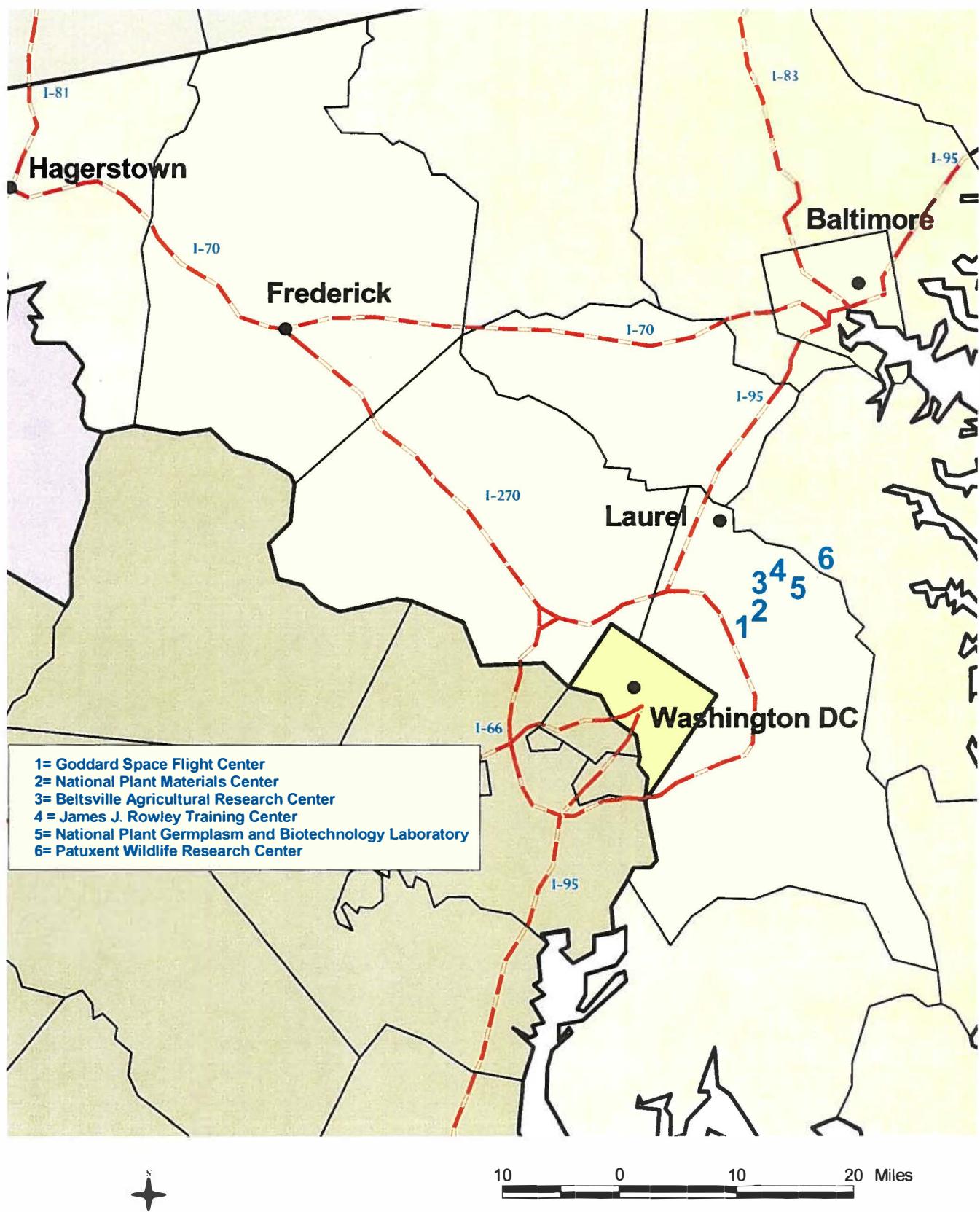
United States Department of Agriculture, Forest Service, Whiteman, Rodney L. and Bradley P. Onken. January 2003. Biological Evaluation of Gypsy Moth at Patuxent Wildlife Research Center 2002. Internal report prepared by Forest Health Protection staff, Morgantown, WV. Unp.

West Virginia Division of Forestry. 1997. *In* 1997 Cooperative State-County-Landowner Gypsy Moth Suppression Program in West Virginia. 3p. (Brochure).

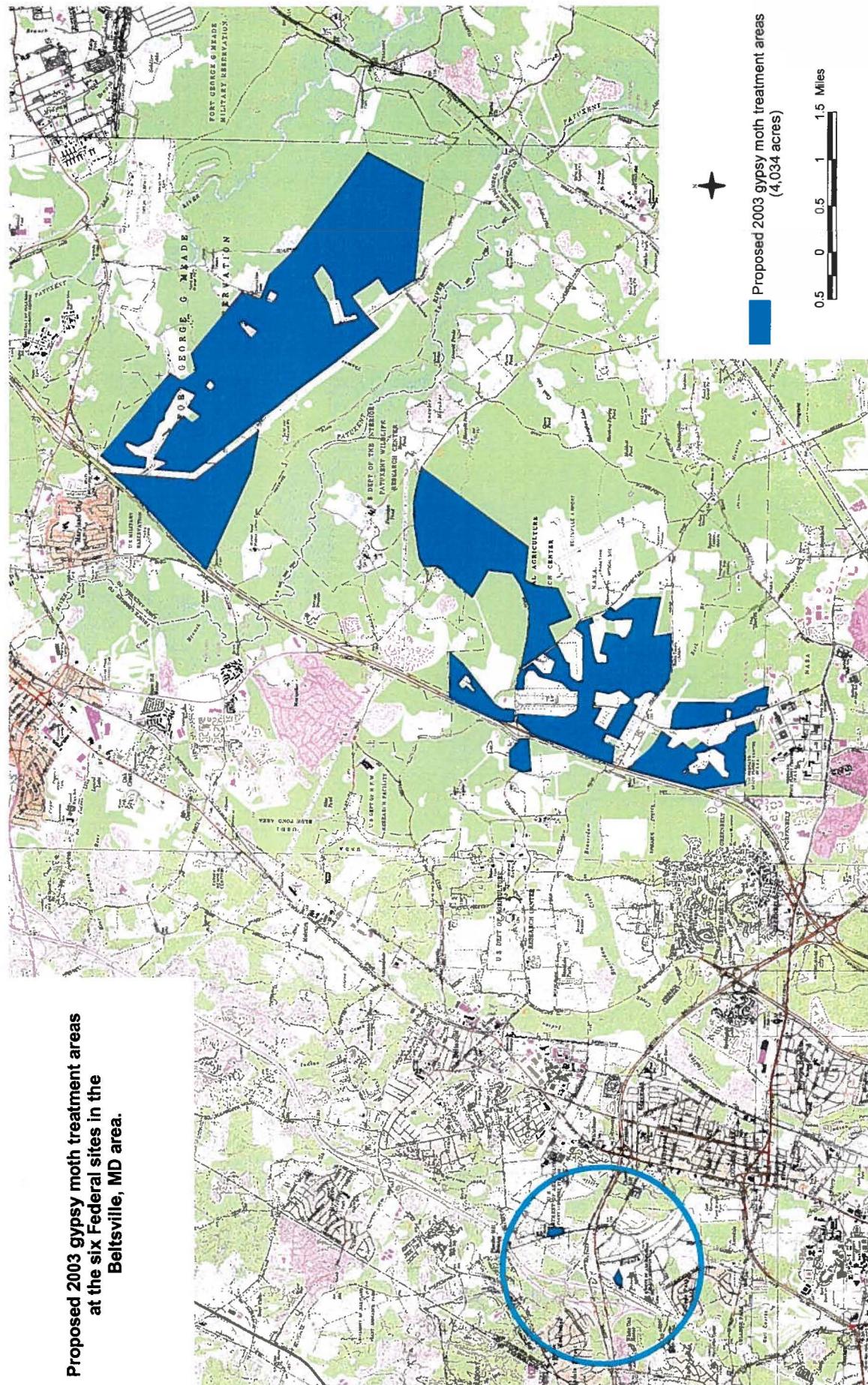
APPENDIX A

Maps of the 2003 Proposed Gypsy Moth Treatment Areas

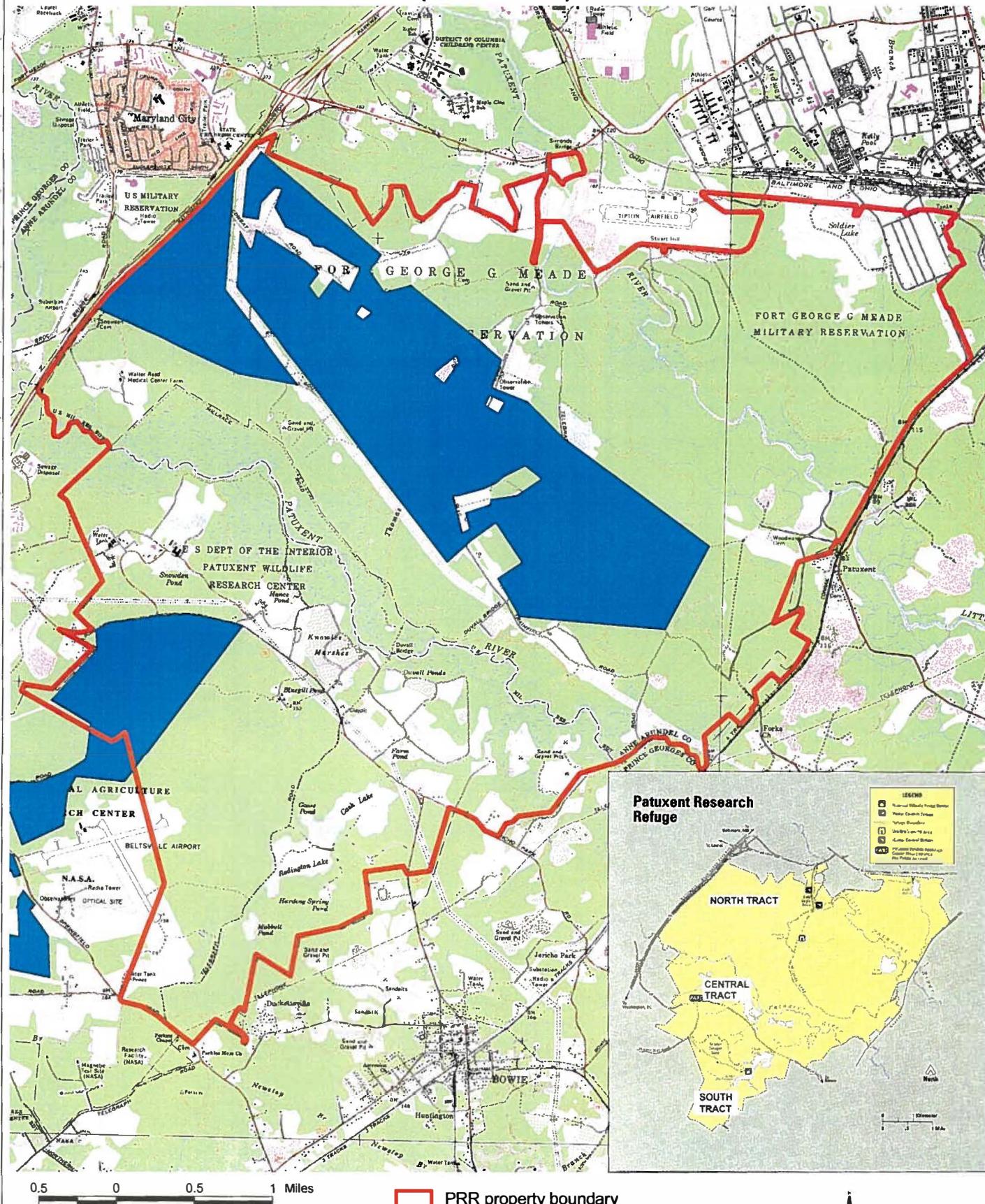
General location map of the six Federal sites.



**Proposed 2003 gypsy moth treatment areas
at the six Federal sites in the
Beltsville, MD area.**



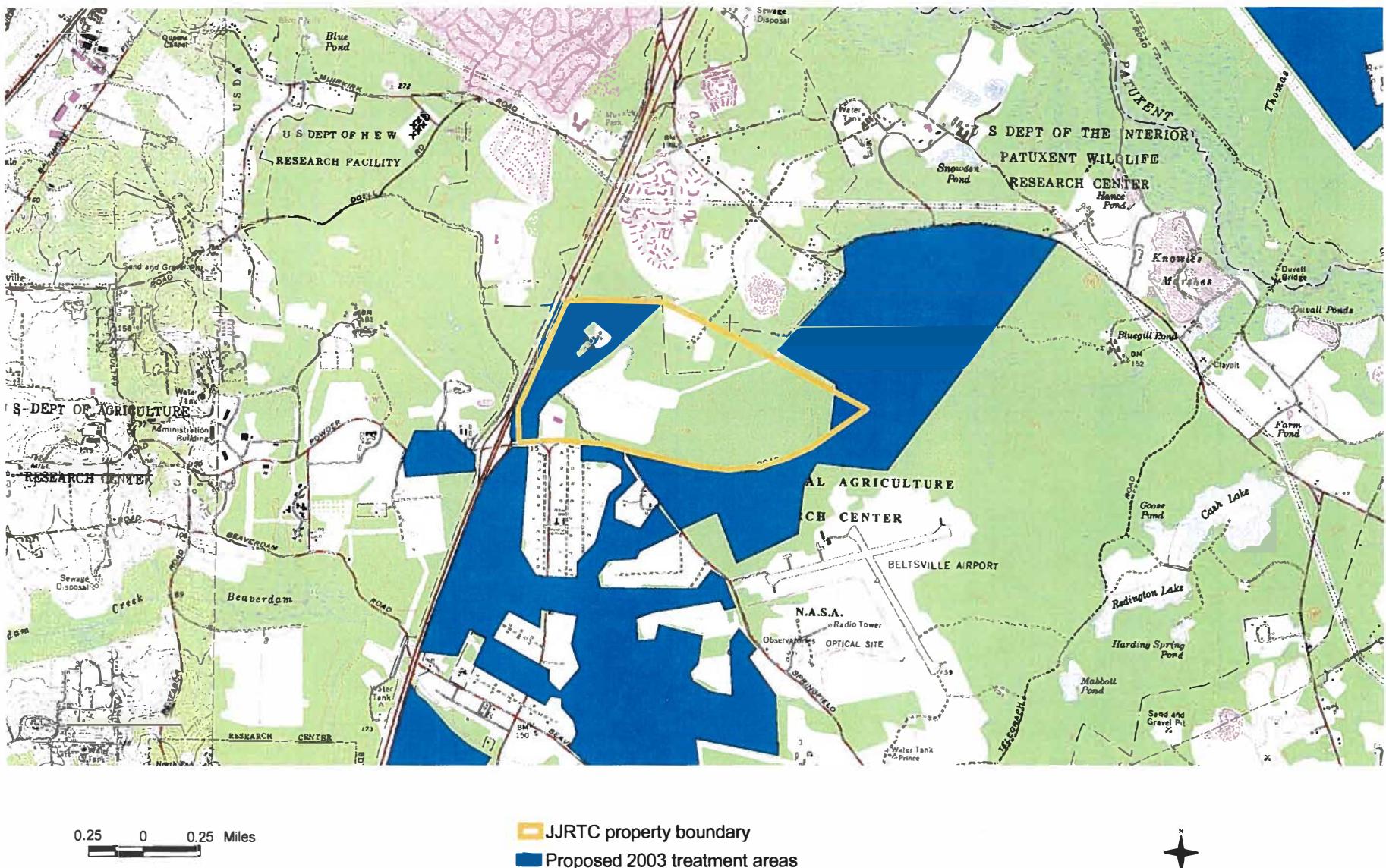
Proposed 2003 gypsy moth treatment areas at Patuxent Research Refuge (2,782 acres)



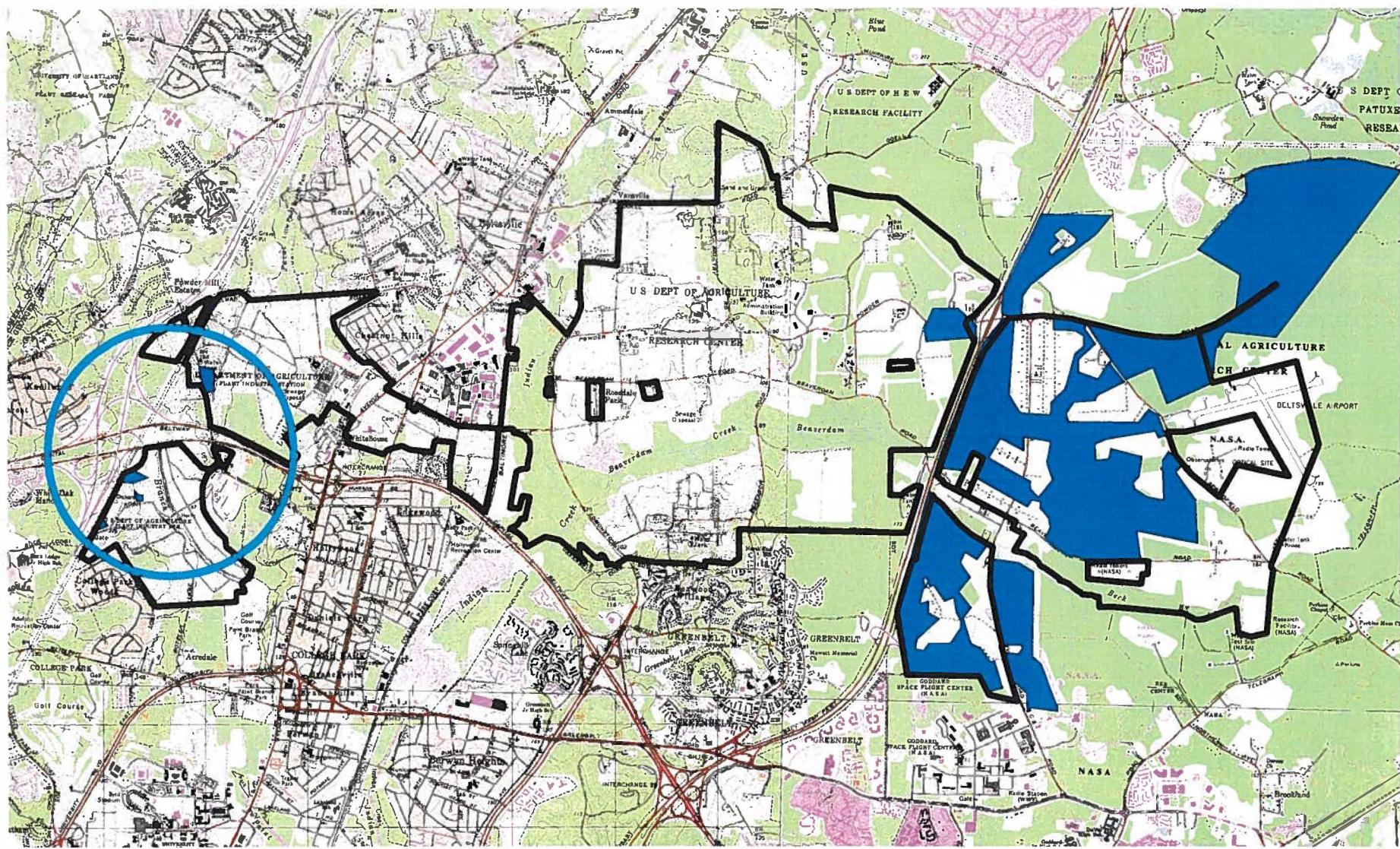
 PRR property boundary

Proposed 2003 treatment areas

**Proposed 2003 gypsy moth treatment areas at James J. Rowley Training Center
(92 acres)**



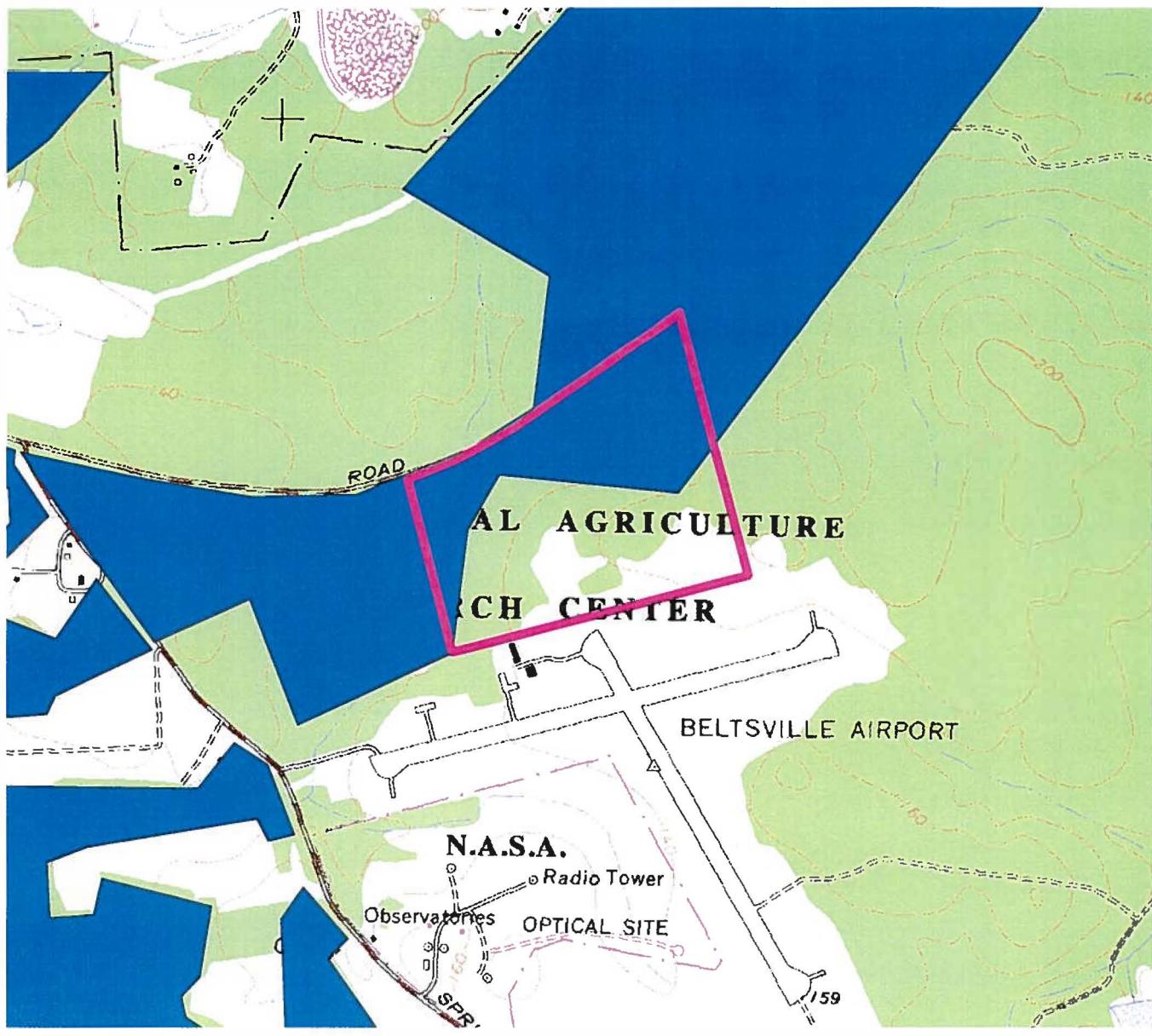
Proposed 2003 gypsy moth treatment areas at Beltsville Agricultural Research Center (986 acres)



BARC property boundary

Proposed 2003 treatment areas

**Proposed 2003 gypsy moth treatment area at
National Plant Germplasm and Biotechnology Laboratory
(60 acres)**



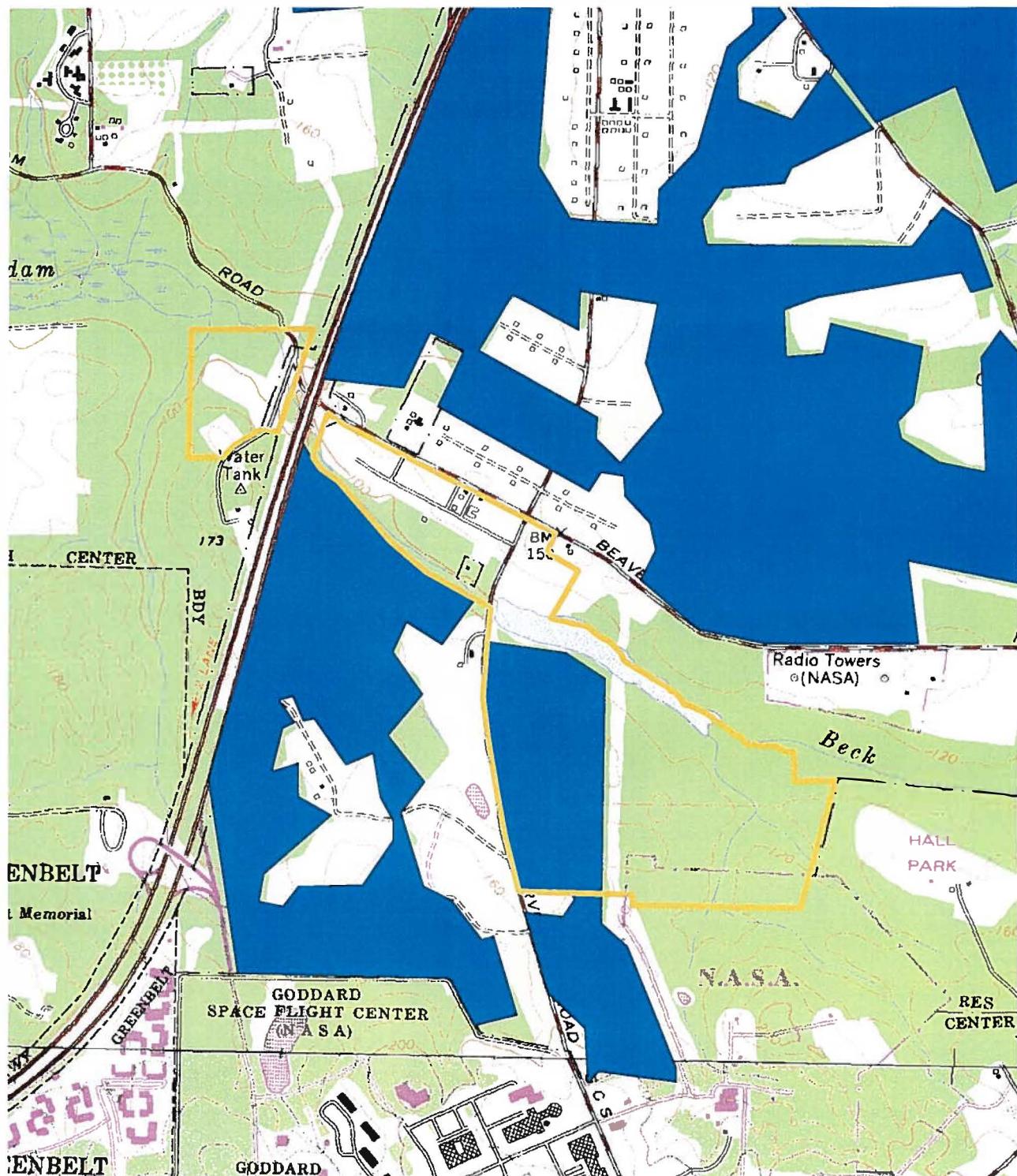
0.25 0 0.25 Miles



 NPGBL property boundary

 Proposed 2003 treatment areas

Proposed 2003 gypsy moth treatment areas at National Plant Materials Center (72 acres)

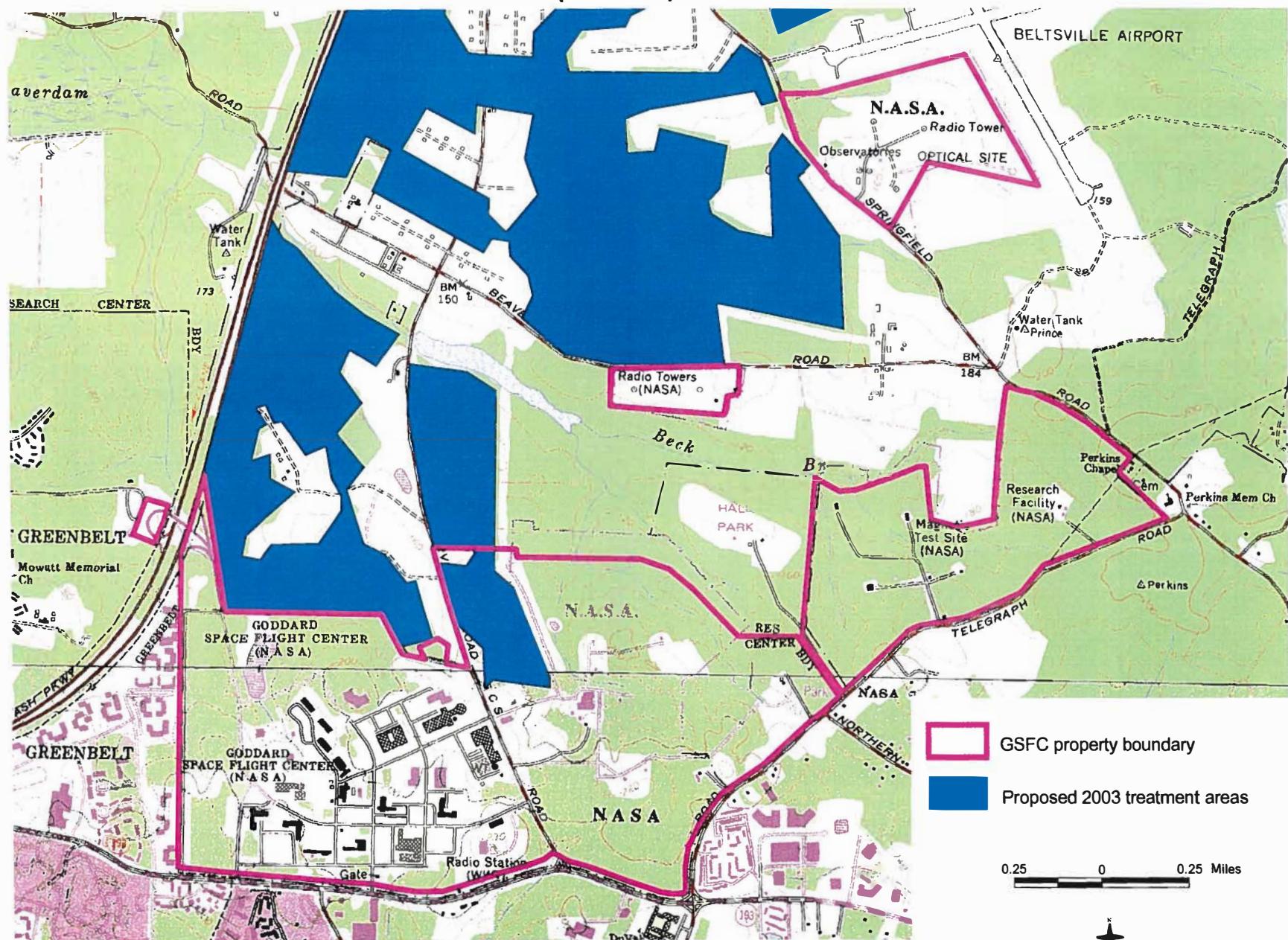


0.25 0 0.25 Miles

NPMC property boundary

Proposed 2003 treatment areas

Proposed 2003 gypsy moth treatment area at Goddard Space Flight Center -(42 acres)



APPENDIX B

Letters from USDI Fish and Wildlife Service and Maryland Department of Natural Resources, Wildlife and Heritage Service



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401



April 2, 2003

Forest Health Protection
USDA Forest Service
180 Canfield Street
Morgantown, WV 26505-3101

Attn: Ms. Karen Felton, Biologist

Re: *Gypsy Moth Suppression Project on Federal lands in the Beltsville, MD area for the spring of 2003*

Dear Ms. Felton:

Thank you for your letter of January 6, 2003, requesting a review of the gypsy moth suppression project on Federal lands for the spring of 2003. The purpose of the proposed action is to prevent the gypsy moth from causing tree defoliation and potential tree mortality on approximately 4,591 forested acres, in order to prevent negative economic and environmental impacts which conflict with site management objectives, such as adequate visual screening (security) and protection of current research studies. These comments are provided in accordance with the requirements of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

We have reviewed the proposed gypsy moth suppression project for the spring of 2003. The U.S. Fish and Wildlife Service (Service) concurs that this proposed action is not likely to adversely affect any federally listed, proposed, or candidate species or critical habitat pursuant to the Endangered Species Act of 1973, as amended.

Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered. Until such time, no further Section 7 consultation with the U.S. Fish and Wildlife Service is necessary.

We appreciate the opportunity to provide information relevant to fish and wildlife resources. Should you have any questions or concerns regarding this letter, please contact Trevor Clark of my Endangered Species staff at (410) 573-4527 or by email at trevor_clark@fws.gov.

Sincerely,

Mary Patruswamy

Trev

John P. Wolflin
Supervisor

cc: Maryland Department of Natural Resources, Wildlife and Heritage Division
(ATTN: Lynn Davidson)
USGS, Patuxent Wildlife Research Center
(ATTN: Holly Orbrecht III)
Ecological Services, Region 5, Hadley, MA
(ATTN: Paul Nickerson, Endangered Species Coordinator)



Robert L. Ehrlich, Jr.
Governor

C. Ronald Franks
Secretary

Michael S. Steele
Lt. Governor

W. P. Jensen
Deputy Secretary

Maryland Department of Natural Resources

Tawes State Office Building
580 Taylor Avenue
Annapolis, Maryland 21401

March 19, 2003

Ms. Karen Felton
Forest Health Protection
USDA Forest Service
180 Canfield St
Morgantown, WV 26505

Dear Ms. Felton,

We have reviewed the 2003 gypsy moth spray block information you have provided regarding the use of Gypchek in the Beltsville, Maryland area. We have no concerns or comments at this time in relation to potential impacts to rare, threatened or endangered species.

Thank you for allowing us the opportunity to review your project. Please let me know if I can be of any further assistance.

Sincerely,

Lynn Davidson
Natural Heritage Program
Wildlife and Heritage Service

cc: Tim Larney, WHS